STANDARD 5 – WATER QUALITY

Water quality meets state standards.

1) Characterization:

In 1972, the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act, was signed into law. Its purpose is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The Act gave the Environmental Protection Agency the authority to implement pollution control programs through partnerships with individual states. Provisions for establishing water quality standards were included in the Clean Water Act, as amended, and in the Wyoming Environmental Quality Act, as amended. Regulations are found in Part 40 of the Code of Federal Regulations and in Wyoming's Water Quality Rules and Regulations. The latter regulations contain Quality Standards for Wyoming Surface Waters.

The State of Wyoming has surface water quality standards for water bodies rated from class 1 to 4. Each rating class has specific numeric and narrative water quality standards. Class 1 waters of the State are waters where no additional water quality degradation will be allowed. Classes 2 through 4 waters are differentiated based on their ability to support aquatic life, fish and other human and wildlife uses. In general, Class 2 waters support game fisheries, Class 3 waters are non-game fisheries protected for aquatic life, and Class 4 waters do not have the potential to support fish and contain few areas that support aquatic life. An additional, the classification scheme describes the multiple goals of a water body, for example supporting both drinking water and game fish (Class 2AB). The "A" refers to the ability to support drinking water and the "B" refers to its ability to support aquatic life. For example, a 3B classification would be non-game protected for aquatic life, but does not protected for drinking water.

The North Platte River is mostly designated Class 2AB due to the game fisheries on the river and municipal drinking water sources in the basin and downstream. Class 2AB is the highest numeric classification for Wyoming water bodies. Water bodies that do not meet their designated beneficial uses are placed on the State 303(d) list for factors identified that contribute to the impairment. Sage Creek drains into the North Platte and has been listed for habitat degradation and concerns about sediment contribution to the North Platte. The classification was based on a study of the North Platte that concluded that Sage Creek was a major factor effecting turbidity in the North Platte. Sage Creek has received 319 funding, intended to improve conditions through best management practices.

2) Issues and Key Questions:

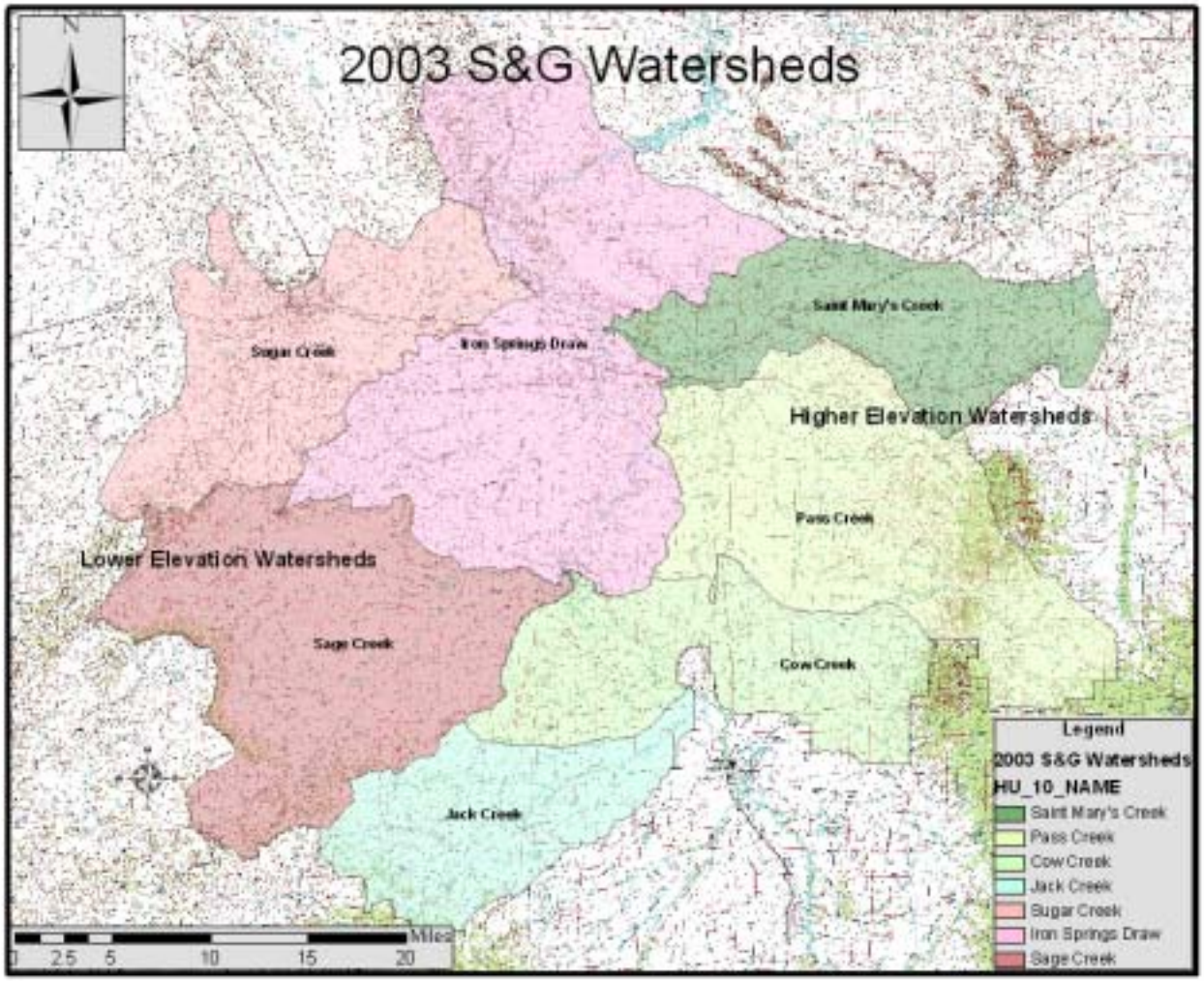
Non-point source impacts to water quality can result from localized erosion due to surface disturbance and also from poorly maintained upland habitats and riparian/wetland systems. These impacts can also result from increased road density which can result in altered surface hydrology (photo 68-1) and decreased vegetative cover. Decreased vegetation can increase erosion by exposing soil to wind or water. Overuse of water sources can cause reductions disturbance to vegetation and soils in localized areas and as a result of hoof action can lower the water table in localized areas.

Point source impacts include the potential for toxic spills along the I-80 corridor and other highway systems, industrial, agricultural and municipal discharges. Municipal sources include the towns of Rawlins, Sinclair, Saratoga and upstream contributions form Riverside and Encampment. About the only industrial source is the refinery in Sinclair whose cooling water is discharged via center pivots as a non-point source. A small portion of the Seminoe Road Coalbed Natural Gas project is in the Analysis Area and this will contribute additional water to Seminoe reservoir mostly below and north of the beginning of the North Platte Arm of the reservoir. This water will have higher than background TDS and could create erosional problems if systems are improperly designed.

3) Current Conditions:

In general, water quality is excellent in the North Platte watershed and is evident by the water quality classifications described in the characterization section. In most cases, classifications are based on the beneficial uses supported by the water quality present. Some areas in North Platte River basin have soils with high erosion potential predominate, and can result in high TDS and/or TSS. High TDS or TSS values can lead to high turbidity and can reduce the habitat of water bodies for some fish species such as trout. Water with high TDS and/or TSS can also be expensive to treat for municipal water supplies. Table 3 for the North Platte has exceedences for Turbidity measured downstream from the analysis area, these high values don't seem to correlate with high flows or timing, Figure 2.

Current conditions in the North Platte River basin include the consideration of Seminoe reservoir which provides important recreational opportunities and is protected for the game fisheries by a 2AB classification. Water quality in reservoirs is mostly driven by nutrients. Nutrients can cause Algal blooms that may lead to eutrophication and anaerobic (no available oxygen) conditions. Some metals are more likely to go into the dissolved state when oxygen in lacking, and therefore it is important to monitor the accumulation of nutrients in reservoirs. . The most common source for nutrients is large confined animal operations such as feedlots and municipalities. There are no feedlots in the analysis area and a limited amount of small municipal systems upstream. In general, the lowering of reservoirs in the headwaters in response to irrigation demands downstream allow for enough circulation to prevent euthrophic conditions


2003 S&G Watersheds
N
Saint Mary's Creek
Iron Springs Draw
Sugar Creek
Higher Elevation Watersheds
Pass Creek
Lower Elevation Watersheds
Sage Creek
Cow Creek
Jack Creek
Legend
2003 S&G Watersheds
HU_10_NAME
Saint Mary's Creek
Pass Creek
Cow Creek
Jack Creek
Sugar Creek
Iron Springs Draw
Sage Creek
Miles
0 2.5 5 10 15 20

Upper North Platte Sub-basin (HUC 10180002)

The Upper North Platte Sub-basin is that area upstream of Seminoe Reservoir to the Colorado Line (see Figure xx). The upper portion of this sub-basin, like most of the high elevation basins in Wyoming, contains bottom lands which are privately owned and irrigated for hay production. Generally, the uplands are grazed early and/or late in the year, and the higher elevations are grazed in the summer. Much of the forested area in the Upper North Platte was harvested for railroad ties historically. Many of the larger mountain streams were straightened and had logs and boulders removed to facilitate tie driving, i.e. running the ties down streams to be picked up by the railroad. There is some oil and gas production in the sub-basin, and Sinclair has an oil refinery. There are no large scale mining operations, but historically there has been considerable gold and copper mining in both the Sierra Madre and Medicine Bow mountains. There has also been some limited coal mining in this basin, and gravel mines are scattered throughout. Natural hot springs in and near Saratoga slightly increase the temperature and dissolved solids content of the river.

Sage Creek Watershed (HUC 1018000209)

Sage Creek has a naturally high sediment load due to the highly erosive soils and arid climate in much of the watershed (photo 71-1). It has been identified by several studies as the most significant contributor of Total Dissolved Solids (TDS) and/or Total Suspended Solids (TSS) to the Upper North Platte River and is on Table C of the 303(d) List (photo 71-2,71-2). Additionally, dam failures, road building and past grazing practices have resulted in increased erosion and sediment loading, especially from the lower portion of the watershed.

In 1997 the Sage Creek Watershed 319 project began. This project is using a combination of short duration grazing, riparian and 47 2004 Public comment draft drift fencing, off channel water development, improved road management, grade control structures and water diversion and vegetation filtering to reduce sediment loading from Sage Creek to the North Platte, as well as improving water quality within Sage Creek.

Hugus and Iron Springs Draw drainages are Class 3B waters, with intermittent to ephemeral stream channels. Although historically impacted by past grazing practices, existing information and data indicate no significant water quality problems. Sugar Creek flows through Rawlins and enters the North Platte just upstream of Seminoe Reservoir. Some concerns with the physical condition of the watershed above Rawlins have been raised. Rawlins' waste water treatment plant discharges to Sugar Creek, but the stream rarely flows all the way to its confluence with the North Platte River.

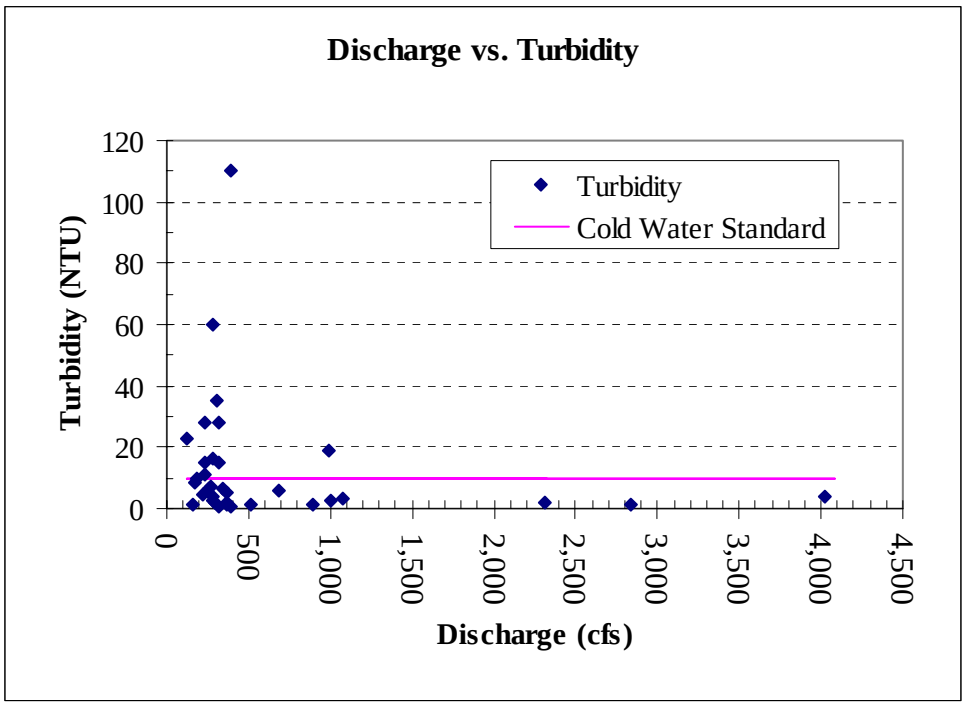


Figure xx: Discharge vs. Turbidity for the North Platte Gage.

	Discharge, Instantaneous (cfs)	Arsenic Dissolved (µg/L)	Cadmium Dissolved (µg/L)	Selenium Dissolved (µg/L)	Iron Dissolved (µg/L)	Chloride Dissolved (µg/L)	Manganese Dissolved (µg/L)	Nitrogen (Nitrate and Nitrite) Dissolved (mg/L)	Turbidity (NTU)
USGS Param #	61	1000	1025	1145	1046	940	1056	631	76
Standard	--	**340**	**4.3**	**20**	**300**	**230**	**50**	**10**	**10**
02/25/87	390	1	1	1	40	11.0	13	0.10	0.6
06/30/87	370	1	1	1	20	9.5	7	0.10	1.0
09/16/87	270	2	1	1	10	11.0	11	0.10	7.2
11/23/87	345	2	1	1	20	30.0	17	0.10	6.7
01/05/88	370	1	1	1	20	18.0	9	0.10	1.9
03/28/88	390	2	1	1	120	9.8	**68**	0.10	**110.0**
07/26/88	1000	2	2	1	20	8.4	4	0.10	2.7
12/07/88	4020	1	1	1	50	9.9	6	0.10	4.0
02/15/89	2840	1	1	1	--	9.0	1	0.14	1.4
05/02/89	680	1	1	1	90	4.8	16	0.10	5.9
07/18/89	510	2	1	1	20	8.1	19	0.10	1.5
12/11/89	231	2	1	1	10	10.0	10	0.10	**11.0**
01/30/90	280	1	1	1	20	8.9	7	0.10	4.1
04/10/90	315	1	1	1	220	8.0	13	0.10	**28.0**
08/01/90	280	1	1	1	20	3.8	7	0.10	**60.0**
10/16/90	285	2	1	1	20	5.5	7	0.10	**16.0**
01/28/91	185	1	1	1	20	8.6	11	0.10	10.0
04/18/91	235	1	1	1	110	7.9	38	0.05	**15.0**
06/06/91	305	1	1	1	130	4.6	8	0.05	**35.0**
08/06/91	993	2	1	1	40	8.5	8	0.05	**19.0**
12/03/91	1070	--	--	1	20	12.0	12	0.05	3.1

Table xx: Water Quality (1987-1991) from USGS Station 06630000 North Platte River above Seminoe Reservoir near Sinclair, Wyoming

4) Reference Conditions:

Reference conditions are taken mostly from the historic accounts by Col. John Charles Fremont, other explorers and later travelers on the Overland Trail that bisects the analysis area north to south.

The Life of col. John Charles Fremont, and his narrative of exploration and adventures, in Kansas, Nebraska, Oregon and California.

Fremont's narrative includes portions of the North Platte and Sweetwater River as traveled in July and August of 1842. There is no mention of fish, however he did not note that there weren't fish present in the North Platte. Fremont estimates the width of the North Platte to be 70 yards (210 ft) in one location, probably below or under Pathfinder Reservoir. He also described islands and most likely the channel was braided indicating sediment deposition. The year Fremont traveled was during a drought according to the Indians in the area and grass was sparse.

Madison Moorman in June of 1850 notes that they caught some "cat fish" in the Laramie, probably some type of warm-water fish (Erb et.al., 1989). Typical accounts during this time would note trout if present. Some have assumed this means there were not trout in the lower part of the Upper North Platte Valley.

Elevation in the Analysis Area is 6,300 ft. in the North Platte Arm of Seminoe reservoir to 11,156 ft on Elk Mountain. The majority of the land area is 7,000 to 8,000 ft. Snow storms can happen year round at the higher elevations, and as late as July in the majority of the area. On June 16, 1865 Lewis Byrum Hull noted that it was cold and snowed nearly all day at the Pass Creek station along the overland trail. Rattlesnake Canyon below Rattlesnake Pass was described by emigrant J. Zeamer as, "thickly lined with bushes and whose current in many places was interrupted with beaver dams." The overland trail crosses Pass Creek after this canyon and not much is mentioned of this crossing (Dorn, R.D. 1986).

The Overland Trail crossed the North Platte River at Johnson Island formed by an oxbow in the river abundant with cottonwood and willow. A ferry was operated on this site and the main channel of the river is described as deep and swift in July 1865, by emigrant J. Zeamer. Driftwood was abundant and the oxbow could be waded over to Johnson Island and crossed by horses without wagons. In June 22, 1866 the North Platte at this locations was described a rushing torrent that was too swift and deep to be crossed, other than by ferry. On this day the rope broke and the ferry was lost on a crossing.

Fourteen miles west of the North Platte Crossing was the Sage Creek stage station, it is described much as it exists today with sparse sagebrush and greasewood flats with very little water. Sage Creek and Miller Creek did not provide a challenge for crossing in June of 1865 and dried up in portions of the channel according to J Zeamer.

5) Synthesis and Interpretations:

Managing livestock and evaluating road designs on a project and allotment basis is the best way to address human contributions and can be measured and evaluated on a case-by-case basis or in monitoring vegetation condition. Livestock grazing, road density and other human practices contribute to non-point pollution. Human disturbances may be additive to natural disturbance that may lead to exceedences; however separating human from natural disturbance sources is difficult at best.

A review of the reference conditions shows that the loss of buffalo and beavers in this area was most likely the most significant change from pre-European settlement. Disturbance from buffalo includes intense use in alternating areas, hoof action and grazing on uplands. Not very much is known about

ecosystem interactions with buffalo in sagebrush, however the lack of biologic crusts in areas where buffalo were know to be abundant and some indication that sagebrush has expanded East of Laramie indicate that buffalo may have been a significant factor in vegetation composition and range. Beavers certainly have a great influence on riparian systems, ponding water behind dams and introducing disturbance in riparian systems with a woody component. From early accounts it can be assumed beavers where higher in number and greater in range in the past compared with present conditions.

Non-Point Pollution Sources

Livestock can contribute to vegetation disturbances altering the developed soil profile by degrading protective vegetation and the structure of the soil horizons. This disturbance can reduce infiltration, increase runoff, and create more soil compaction.

Soil compaction increases water runoff and thereby promotes sheet, rill and gully erosion on site and stream down cutting and gullying off site. The greatest compaction occurs when soils are moist or wet. Compacted soils are less accommodating to plant roots, and seed germination is difficult in such soils. This physically reduces soil productivity. Increases in water runoff increase peak flows in perennial and ephemeral drainages. Increased flows can upset stream equilibrium, causing streams to downcut and ephemeral tributaries and other drainages to gully. Water tables may drop, reducing moisture available for plant growth.

Disturbance in or adjacent to riparian areas can increase sediment into channels and degrade water quality. The PFC analysis method is designed to evaluate if a given riparian or wetland system is sustainable during a typical disturbance such as flooding. If a stream channel is degraded it is an indication that the system will contribute to water quality problems by eroding during a storm event. Riparian and wetland systems can also be an effective buffer by trapping suspended sediment during storm events, therefore if they are degraded the quality of the water downstream will generally be lower than if the system was healthy.

Point Source Pollution

Point sources of pollution are regulated by the State of Wyoming using the National Pollutant Discharge Elimination System (NPDES) Program. Industrial and municipal sources are generally a small factor due to the low population density. The development of natural gas from coal seams, may contribute a small amount of generally good quality with TDS values of 1000-2000 mg/L. However, regardless of the water quality, the release of this water into systems that are adapted to current flow conditions, in itself, may cause erosion and lead to increased sediment loads as the channel adjusted to higher and changes in seasonal flows from discharges.

6) Recommendations:

Sage Creek has a naturally high dissolved and suspended sediment loads due to erosion and sediment loading, especially from the lower portion of the watershed (photo 75-1,75-2). BLM and permitties should continue to actively participate in the Sage Creek Watershed 319 project. This project is using a combination of short duration grazing, riparian and fencing, off channel water development, improved road management, grade control structures and water diversion and vegetation filtering to reduce sediment loading from Sage Creek to the North Platte, as well as improving water quality within Sage Creek (photo 75-3, 75-4) .

The BLM will continue to implement or refine BMPs for livestock grazing, which promote perennial vegetation to stabilize stream banks and improve cover and litter on uplands. Season and duration of use are the principal factors in considering management changes to address this standard. BLM will continue to identify and correct existing road problems that alter surface water flows and result in accelerated erosion. The BLM will continue to promote mixed-age shrub and woodland communities with higher proportions of young and middle-aged stands, which have greater amounts of herbaceous cover to reduce runoff and soil erosion and increase infiltration and ground water recharge. BLM will assure the design and plan surface discharge facilities for CBM to reduce impacts on water quality, and minimize road development through transportation plans.